

CLAIMS

We claim:

1. An article processed by a method comprising:
  - (a) generating plasma;
  - 5 (b) moving the article as the article contacts the plasma, wherein a motion of the article comprises at least a first rotational motion, a second rotational motion, and a third rotational motion which occur simultaneously.
2. An apparatus for moving an article through plasma, the apparatus comprising:
  - 10 a first arm rotatable around a first axis;
  - a second arm rotatably attached to the first arm to rotate an article around a second axis; and
  - a rotational mechanism for inducing a rotational motion of the article in addition to, and simultaneously with, the rotation of the first and second arms.
- 15 3. The apparatus of Claim 2 further comprising a body fixedly attached to the first arm;
  - wherein the rotational mechanism comprises:
  - a rotatable member for rotating the article; and
  - a link coupled to the body and the rotatable member.
- 20 4. The apparatus of Claim 3 wherein the link is driven by the rotatable member due to the rotation around the second axis, and the link causes the rotatable member to rotate the article due to (i) coupling between the link and the body and (ii) coupling between the link and the rotatable member.
- 25 5. The apparatus of Claim 3 wherein the apparatus comprises a non-contact article holder, and the rotatable member is positioned to be coupled to an edge of the article held in the holder.
6. The apparatus of Claim 3 wherein the apparatus comprises an article holder drivable by the rotatable member.
- 30 7. The apparatus of Claim 2 further comprising a non-contact article holder rotatable by the rotational mechanism.

8. The apparatus of Claim 7 wherein the article holder comprises a member coupled to a side of the article by a centrifugal force developed by rotation of the second arm, to drive the article from the rotational mechanism.

5 9. The apparatus of Claim 2 further comprising a plasma source for generating the plasma, wherein the article has a surface all of which is to be processed with the plasma, but at any time when the plasma contacts the article, a distance between the first axis and a plasma region contacting the article is greater than a distance between the first axis and said surface.

10 10. The apparatus of Claim 2 further comprising a plasma source for generating the plasma, wherein the article has a surface all of which is to be processed with the plasma, but at any given time at most a portion of said surface is in contact with the plasma.

15 11. The apparatus of Claim 10 wherein at any given time T1 when the surface is in contact with the plasma, the surface has points moving at different speeds, and the point which has the lowest speed at the time T1 is not contacted by the plasma, but said point is contacted by the plasma at other time when said point is not the point having the lowest speed.

20 12. The apparatus of Claim 2 further comprising a plasma source for generating a plasma jet which is too narrow to cover the article, the apparatus being for moving the article in and out of the plasma jet.

13. The apparatus of Claim 2 wherein the article processing is performed at atmospheric pressure.

14. The apparatus of Claim 2 wherein the article processing is an etch.